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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,527	10/21/2003	Masaru Mitsui	330-270	8629

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EXAMINER	
ROSASCO, STEPHEN D	
ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 05/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/689,527	MITSUI ET AL.	
	Examiner	Art Unit	
	Stephen Rosasco	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/9/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

The term "predetermined optical property" in claims 1 and the term "different optical property in claim 2 are relative terms which render the claims indefinite. The terms are not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

The last section of the claims is also unclear- "the relationship between the ratio selected so as to give a predetermined optical property of the half-tone film, at a reactive gas flow rate selected from a region where a discharge characteristic is stabilized against a change in the flow rate of the reactive gas.

It is unclear what ratio is being referred to and the phrase from "discharge" on, is completely unclear. Discharge characteristic of the film being formed? Stabilized = defined how? with respect to the flow rate?

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-5 are rejected under 35 U.S.C. 102(e) as being anticipated by Okazaki et al. (6,511,778).

The claimed invention is directed to a half-tone phase shifting mask and and a process for manufacturing half-tone phase shifting mask blanks each having a phase shifting film containing at least one half-tone film on a transparent substrate, comprising the step of providing a target containing a metal and silicon, and carrying out reactive sputtering in an atmosphere containing a reactive gas, to form said half-tone film on said transparent substrate, wherein the formation of the half-tone film by said reactive sputtering is carried out using, as said target, a target having a metal/silicon composition.

Okazaki et al. teach a method of manufacturing a phase shift mask, comprising the steps of: forming a phase shifter composed primarily of a fluorine-doped metal silicide comprising a fluorine-doped chromium suicide, fluorine-doped molybdenum silicide or fluorine-doped gadolinium gallium silicide, and at least one element of oxygen, nitrogen or carbon, on a substrate transparent to exposure light using a sputtering technique wherein the sputtering is carried out using chromium silicide, molybdenum silicide or gadolinium gallium silicide as the target, and using SiF sub.4, CF sub.4 or NF sub.3 as the reactive gas, lithographically forming a resist pattern on the phase shifter, and patterning the phase shifter by dry etching or wet etching through the resist pattern.

And wherein in the step of forming a phase shifter, sputtering is carried out using chromium, molybdenum or gadolinium gallium as the target, and using SiFsub4 as the reactive gas.

And wherein in the step of forming a phase shifter, sputtering is carried out by reactive sputtering using a mixed gas composed of an element source gas which supplies an element selected from among oxygen, nitrogen and carbon in admixture with an inert gas and a reactive gas.

Okazaki et al. also teach (col. 6, lines 1-16) that the element source gas can be used at a flow rate such that the element ratio of the element thus supplied relative to the inert gas is 1 to 40% for oxygen, 1 to 20% for nitrogen, and 1 to 10% for carbon. A relatively small amount of the gas used in reactive sputtering is capable of changing the refractive index of the shifter film.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki et al. (6,511,778).

The claimed invention is directed to a half-tone phase shifting mask and and a process for manufacturing half-tone phase shifting mask blanks each having a phase shifting film containing at least one half-tone film on a transparent substrate, comprising the step of providing a target containing a metal and silicon, and

carrying out reactive sputtering in an atmosphere containing a reactive gas, to form said half-tone film on said transparent substrate, wherein the formation of the half-tone film by said reactive sputtering is carried out using, as said target, a target having a metal/silicon composition.

The applicant discusses the limitations of the prior art in that in the optical properties of half-tone phase shifting mask blanks, conventionally, it has been required to control the transmissivity variation to be +-1% and control the phase shifting amount to be +-5 degree. In recent years, however, it has come to be required to attain a transmissivity variation of +-0.4%, desirably, +-0.2% and a phase shifting amount variation of +- 4 degree, desirably, +-2 degree. With a decrease in the wavelength of an exposure beam, however, it tends to be still more difficult to control the above variations to be in the above tolerable ranges. When the above various kinds of half-tone phase shifting mask blanks having various optical properties are manufactured with one mass-production apparatus, it has been difficult to set film-forming conditions under which the optical properties do not vary with regard to the optical properties of each kind.

Okazaki et al. teach a method of manufacturing a phase shift mask, comprising the steps of: forming a phase shifter composed primarily of a fluorine-doped metal silicide comprising a fluorine-doped chromium suicide, fluorine-doped molybdenum silicide or fluorine-doped gadolinium gallium silicide, and at least one element of oxygen, nitrogen or carbon, on a substrate transparent to exposure light

using a sputtering technique wherein the sputtering is carried out using chromium silicide, molybdenum silicide or gadolinium gallium silicide as the target, and using SiF.sub.4, CF.sub.4 or NF.sub.3 as the reactive gas, lithographically forming a resist pattern on the phase shifter, and patterning the phase shifter by dry etching or wet etching through the resist pattern.

And wherein in the step of forming a phase shifter, sputtering is carried out using chromium, molybdenum or gadolinium gallium as the target, and using SiFsub4 as the reactive gas.

And wherein in the step of forming a phase shifter, sputtering is carried out by reactive sputtering using a mixed gas composed of an element source gas which supplies an element selected from among oxygen, nitrogen and carbon in admixture with an inert gas and a reactive gas.

The teachings of Okazaki et al. differ from those of the applicant in that the applicant teaches that the flow rate can be changed to stabilize the layer.

However, Okazaki et al. also teach (col. 6, lines 1-16) that the element source gas can be used at a flow rate such that the element ratio of the element thus supplied relative to the inert gas is 1 to 40% for oxygen, 1 to 20% for nitrogen, and 1 to 10% for carbon. A relatively small amount of the gas used in reactive sputtering is capable of changing the refractive index of the shifter film.

Therfore, it would have been obvious to one having ordinary skill in the art to take the teachings of Okazaki et al. and adjust the flow rate to give the desired

optical properties in order to make the claimed invention because it would be obvious from the prior art teachings to adjust the flow rate to give the desired composition and the related optical properties.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Rosasco
Primary Examiner
Art Unit 1756

S.Rosasco
05/18/05